

Effectiveness of Otago Exercise Program on Balance and Fear of Falling in the Eldery: A Systematic Literature

Efektivitas Otago Exercise Program Terhadap Keseimbangan dan Ketakutan akan Jatuh pada Lansia: Systematic Literature Review

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ABSTRACT

Background: Aging leads to a decline in physiological functions affecting balance, thereby increasing fall risk and fear of falling among older adults. The Otago Exercise Program (OEP) was developed to enhance balance and reduce fear of falling, though its efficacy requires further investigation.

Objective: This systematic literature review aimed to assess the effectiveness of the OEP in improving balance and reducing fear of falling in older adults.

Methods: A systematic literature review was conducted following PRISMA guidelines and the PICO framework. Six major databases were searched using the keywords "Otago Exercise Program," "balance," "fear of falling," and "older adults." From 1,289 initially identified articles, 1,262 remained after duplicate removal. Of these, 1,245 were excluded for not meeting inclusion criteria. The final 12 articles were critically appraised using the Critical Appraisal Skills Programme (CASP) 2024 instrument.

Results: The 12 reviewed studies originated from diverse countries (India, Switzerland, Greece, Turkey, Israel, China, Spain, Cyprus, and Iran). Findings consistently demonstrated that OEP improved both static and dynamic balance parameters. Furthermore, most studies reported significant reductions in fear of falling among participants.

Conclusion: The OEP demonstrates efficacy in improving balance and reducing fear of falling among older adults. Future research should implement consistent intervention durations and long-term follow-up assessments to enhance result generalizability.

Keywords: Otago Exercise Program; balance; fear of falling; older adults

ABSTRAK

Latar Belakang: Penuaan menyebabkan penurunan fungsi fisiologis yang mempengaruhi keseimbangan, meningkatkan risiko jatuh, dan memicu ketakutan akan jatuh pada lansia. Otago Exercise Program (OEP) dirancang untuk meningkatkan keseimbangan dan mengurangi ketakutan jatuh, meskipun efektivitasnya masih terus dikaji.

Tujuan: Penelitian bertujuan untuk mengevaluasi efektivitas OEP dalam meningkatkan keseimbangan dan mengurangi ketakutan jatuh pada lansia melalui tinjauan literatur secara sistematis.

Metode: Penelitian ini menggunakan metode systematic literature review mengikuti pedoman PRISMA dan kerangka PICO. Penelusuran literatur dilakukan melalui enam database utama dengan kata kunci "Otago Exercise Program", "balance", "fear of falling", dan "older adults". Sebanyak 1,289 artikel diidentifikasi, lalu 1,262 artikel disaring setelah duplikasi dihapus. Dari jumlah tersebut, 1,245 artikel dikecualikan karena tidak memenuhi kriteria inklusi. Tersisa 12 artikel yang dianalisis menggunakan instrumen Critical Appraisal Skills Programme (CASP) 2024.

Hasil: Dua belas studi yang terpilih berasal dari berbagai negara, termasuk India, Switzerland, Yunani, Turki, Israel, China, Spanyol, Cyprus, dan Iran. Hasil menunjukkan bahwa OEP secara konsisten meningkatkan keseimbangan baik statis maupun dinamis. Selain itu, sebagian besar studi melaporkan penurunan signifikan pada ketakutan akan jatuh.

Kesimpulan: OEP terbukti efektif dalam meningkatkan keseimbangan dan menurunkan ketakutan akan jatuh pada lansia. Penelitian lebih lanjut dengan durasi yang konsisten dan pemantauan jangka panjang diperlukan untuk meningkatkan generalisasi hasil.

Kata Kunci: Otago Exercise Program; keseimbangan; ketakutan jatuh; lansia

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Submitted 29 March 2025

Revised 03 May 2025

Accepted 14 May 2025

INTRODUCTION

Falls among older adults represent a significant global health concern, with the World Health Organization (WHO) identifying them as the second leading cause of unintentional injury deaths worldwide, resulting in approximately 6 million fatalities annually (WHO, 2021). Notably, 80% of these deaths occur in low- and middle-income countries, while approximately 37.3 million older adults experience falls requiring medical intervention (Mushtaq *et al.*, 2024; Zhang, 2024). In Indonesia specifically, fall-related injuries affect 49.4% of individuals aged over 55 years, increasing to 67.1% in those aged 65 years and older (Prihandhani and Bulan Trisna, 2024). These incidents significantly compromise functional independence and quality of life while contributing to increased morbidity, mortality, and healthcare expenditure (Montero-Odasso *et al.*, 2022). Such epidemiological evidence underscores falls in older adults as a critical public health priority requiring urgent attention at both global and national levels.

The aging process, which varies between individuals, is characterized by progressive physiological decline affecting balance function through deterioration of visual, vestibular, and proprioceptive systems. These age-related changes frequently result in balance impairment and elevated fall risk (Venugopal *et al.*, 2023; Wang *et al.*, 2024). Additionally, perceptions of aging may influence fear of falling and fall risk assessment, further exacerbating balance disturbances and increasing vulnerability to falls (Blount *et al.*, 2023; Rossler *et al.*, 2023). Older adults experiencing heightened fear of falling typically report poorer perceived health status, higher fall frequency, and increased prevalence of depression and anxiety (Rider *et al.*, 2025).

The Otago Exercise Program (OEP) has demonstrated efficacy in enhancing

balance, improving confidence in balance control, and reducing fall-related fear among older adults (Chiu *et al.*, 2021). Multiple investigations have specifically confirmed OEP's significant effectiveness in improving balance parameters in geriatric populations (Khumpaneid, Phoka and Khongprasert, 2022; Pyati *et al.*, 2024; Wu *et al.*, 2024a). Moreover, research has documented OEP's positive impact on physical function and fear of falling reduction in Korean women aged 75-84 years (Kang and Kang, 2024). However, findings regarding fear of falling outcomes remain inconsistent, likely due to variations in program implementation protocols, intervention duration, and assessment methodologies (Dupont *et al.*, 2021; Feng *et al.*, 2022).

While substantial evidence supports OEP's effectiveness in improving balance, strength, and reducing fall incidence, outcomes vary considerably depending on implementation modality (group versus individual) and participant demographic characteristics (Yang *et al.*, 2022; Mgbejedo *et al.*, 2023). Current research has predominantly focused on physical parameters including balance and muscular strength (I. D. G. A. Mahendra *et al.*, 2022; Qin *et al.*, 2022; Yi *et al.*, 2023), while investigation of psychological outcomes, particularly fear of falling, remains relatively limited..

Consequently, a comprehensive systematic review is warranted to identify knowledge gaps and reconcile inconsistencies in the existing evidence base. This study aims to systematically evaluate OEP's effectiveness in improving balance and reducing fear of falling among older adults. The findings are expected to inform evidence-based recommendations for healthcare practitioners and policy makers in developing more effective interventions to enhance quality of life among geriatric populations.

MATERIALS AND METHODS

A. Research Design

This systematic review evaluated the efficacy of the Otago Exercise Program (OEP) in enhancing balance and mitigating fear of falling among older adults. The methodology adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines and employed the PICO framework (Page et al., 2021): Population (older adults with balance impairment and fear of falling), Intervention (OEP), Comparison (control groups receiving standard care or alternative exercise regimens), and Outcomes (balance improvement and reduction in fear of falling).

B. Population and Sample

The review analyzed previous studies extracted from health literature databases. The sample selection focused specifically on research investigating OEP's effectiveness on balance and fear of falling in elderly populations.

The literature corpus comprised articles from multiple databases including Google Scholar, ProQuest, Scopus, Science Direct, SpringerLink, and PubMed, published between 2021 and 2025. Initial title screening identified 1,289 potentially relevant articles. After eliminating 27 duplicates, title and abstract screening yielded 184 articles for further evaluation. Subsequently, 167 articles were excluded for not meeting inclusion criteria. Following full-text assessment of the remaining 17 articles, 12 met all eligibility requirements and formed the analytical foundation for this systematic review.

C. Data Retrieval Technique

The literature search utilized the following key terms: "Otago Exercise Program," "balance," "fear of falling," and "older adults." Searches were conducted across predetermined databases, with parameters restricted to English-language publications from 2021 to 2025. This initial search yielded 1,289 documents.

Subsequent screening procedures ensured only articles meeting the predetermined inclusion criteria progressed to final analysis.

Inclusion criteria encompassed: full-text articles pertinent to the research question, primary research studies (both qualitative and quantitative methodologies), and English-language publications between 2021 and 2025. Exclusion criteria comprised: secondary data analyses, unavailable full-text articles, non-English publications, and studies published prior to 2021.

D. Research Instrumens

The systematic review process commenced with database searching, with selection results subsequently visualized using the PRISMA flowchart depicted in Figure 1.

E. Data Analysis Technique

This systematic review followed the latest PRISMA 2020 guidelines. The selection protocol began with duplicate removal, followed by independent title and abstract screening by the investigators. Articles passing initial screening underwent comprehensive full-text review. Data extraction from included studies was systematically organized into tables documenting participant characteristics, research design, intervention protocols, outcome measures, and principal findings, as presented in Table 1.

Methodological quality assessment was conducted independently by two investigators using the Critical Appraisal Skills Program (CASP) 2024 instrument (Table 2). The CASP assessment evaluates 11 methodological domains: (1) clarity of research question, (2) randomization of participant allocation, (3) complete participant follow-up, (4) participant blinding, (5) investigator blinding, (6) outcome assessor blinding, (7) baseline group comparability, (8) equivalent non-intervention treatment across groups, (9) comprehensive reporting of intervention

outcomes, (10) precision of intervention effect estimates via confidence intervals, and (11) benefit-risk-cost analysis, contextual relevance, and value assessment relative to existing interventions (CASP, 2024).

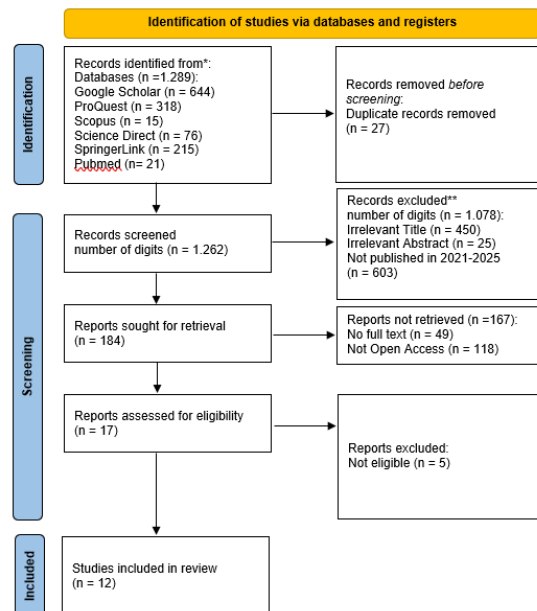


Figure 1. PRISMA Flowchart

RESULT AND DISCUSSION

A total of 1,289 articles were identified from six databases. After removing duplicates (n=27), 1,262 articles proceeded to the initial screening stage. Following title and abstract screening, 1,245 articles were excluded as they did not meet the inclusion criteria. The remaining 17 full-text articles were assessed for eligibility, with 12 studies ultimately meeting all criteria and being included in this systematic review.

A. Article Characteristics

The article selection process followed the PRISMA guidelines, as illustrated in the flowchart. The included studies originated from various countries: India (n=3), Switzerland, Greece, Turkey, Israel, China, Spain, Cyprus, and Iran (n=2).

B. Methodological Quality Assessment

All twelve articles included in this review demonstrated good methodological quality and were therefore retained for

analysis. The risk of bias assessment results are presented in Table 2.

C. Effects of OEP on Balance

Eleven of the twelve studies concluded that the Otago Exercise Program (OEP) effectively improves balance in older adults (Ángeles et al., 2022; Zou et al., 2022; Kulkarni et al., 2022; Lytras et al., 2022; Genç and Bilgili, 2023; Lampropoulou, Kellari and Sakellari, 2023; Pitluk Barash, Shuper Engelhard and Elboim-Gabyzon, 2023; Tep et al., 2023; Hager et al., 2024; Nimmi et al., 2024; Sharahi and Raeisi, 2025). Balance improvements were evidenced by enhanced performance on standardized measures including the Short Physical Performance Battery (SPPB), Five Times Sit to Stand Test (FTSTS), and Four-Stage Balance Test (FSBT) in OEP intervention groups, while control groups typically showed declining performance (Hager et al., 2024).

OEP interventions conducted over 6 to 12 weeks demonstrated improvements in static balance, dynamic balance, and functional ability (Sharahi and Raeisi, 2025). A previous meta-analysis indicated that program duration influences balance outcomes, with programs lasting 13-26 weeks showing greater balance improvements than shorter interventions. However, the difference between shorter and longer programs was not statistically significant, suggesting that longer duration does not necessarily guarantee superior outcomes (Curley et al., 2022; Wu et al., 2024).

When compared to alternative interventions such as Frenkel exercises or Fit-and-Fall Proof (FFP) programs, OEP demonstrated superior effectiveness in improving balance and preventing falls, although FFP showed better results for dynamic balance and quality of life (Tep et al., 2023; Sharahi and Raeisi, 2025). These findings align with previous research indicating OEP's superiority in balance enhancement compared to other training

programs (I. G. P. Mahendra et al., 2022; Satish-Valiv and Bhore, 2022). However, a systematic review reported mixed results when comparing OEP with general balance training for older adults with osteoarthritic conditions, suggesting that effectiveness may vary depending on individual conditions and program duration (Divya N et al., 2023).

D. Effects of Otago Exercise Program on Fear of Falling in the Elderly

A comprehensive analysis of twelve studies revealed that 83.3% (n=10) demonstrated the efficacy of the Otago Exercise Program (OEP) in mitigating fear of falling among elderly populations. This reduction was quantitatively measured through decreased Falls Efficacy Scale (FES) scores in intervention groups. The evidence consistently indicates that OEP is superior in both reducing fear of falling and enhancing functional mobility in older adults (Ángeles et al., 2022; Lytras et al., 2022; Zou et al., 2022; Lampropoulou, Kellari and Sakellari, 2023; Pitluk Barash et al., 2023; Tep et al., 2023; Hager et al., 2024; Nimmi et al., 2024; Mohammadi et al., 2025; Sharahi and Raeisi, 2025).

Longitudinal studies demonstrate that a 6-month OEP intervention effectively reduces fear of falling with sustained benefits observed during 12-month follow-up assessments (Ángeles et al., 2022; Lytras et al., 2022; Tep et al., 2023; Hager et al., 2024). These findings corroborate previous research documenting significant reductions in fear of falling among elderly Korean women following a 6-month OEP implementation (Kang and Kang, 2024). However, contradictory evidence suggests that OEP interventions may exert only minimal to moderate effects on fear of falling in community-dwelling older adults. A critical limitation identified across multiple trials is the insufficient reporting of exercise intensity parameters, which impedes comprehensive understanding of the specific mechanisms

contributing to intervention efficacy (Feng et al., 2022).

Comparative analyses demonstrate that OEP yields superior outcomes in reducing fear of falling compared to alternative interventions such as chair squats (Pitluk Barash, Shuper Engelhard and Elboim-Gabyzon, 2023; Mohammadi et al., 2025). Additional studies confirm OEP's superior efficacy in enhancing mobility, balance, and self-efficacy among older adults relative to other exercise modalities. Interventions primarily targeting strength development or incorporating static exercises demonstrate comparatively diminished effects on these parameters (Kashish, Hussain and Kumar, 2024). While some investigations failed to identify statistically significant differences, these null findings may be attributed to methodological factors including low baseline fear levels or insufficient follow-up duration (Kulkarni et al., 2022; Genç and Bilgili, 2023). Collectively, the evidence substantiates OEP's status as a superior and comprehensive approach for addressing fear of falling and improving balance compared to alternative exercise interventions.

Despite established efficacy in improving balance and reducing fear of falling, several methodological limitations warrant consideration. Heterogeneity in program duration (ranging from 6 to 26 weeks) complicates inter-study comparisons. Furthermore, inadequate documentation of exercise intensity, frequency, and monitoring protocols limits understanding of the critical factors mediating OEP's effectiveness. Additional limitations include samples exhibiting low baseline fear of falling and the absence of extended follow-up assessments beyond 12 months, which may influence outcome interpretation.

Future research directions should prioritize standardized intervention durations and extended follow-up periods

to evaluate sustained effects. Enhanced reporting of intensity parameters, frequency protocols, and implementation methodologies would facilitate replication and program adaptation. Further investigation is warranted regarding the potential synergistic effects of OEP

combined with complementary interventions targeting dynamic balance and quality of life domains. Multi-center trials with larger, more diverse samples are essential to enhance generalizability and applicability across varied clinical and community contexts.

Table 1. Research Characteristics

No.	Title, Author, Year, Country	Objective	Sample	Design. Methods	Results	
					Fear of Falling	Balance
1	The effectiveness of home-based Otago exercise program versus Frenkel's exercise in preventing falls in elderly adults (Tep et al., 2023) India	To compare the effectiveness of home-based Otago exercise and Frenkel exercise in assessing fall risk and fear of falling in elderly adults.	30 elderly individuals with fear or history of falling, divided into two groups: Otago exercise (n=15) and Frenkel exercise (n=15)	Comparative study with 6-month intervention period. Pre- and post-test measurements conducted in Group A (Otago exercise) and Group B (Frenkel exercise).	Otago exercise program demonstrated greater efficacy in reducing fear of falling, as evidenced by a more significant reduction in Falls Efficacy Scale (FES) scores.	Both Otago and Frenkel exercise protocols effectively improved balance parameters in elderly participants.
2	Partially supervised exercise programs for fall prevention improve physical performance of older people at risk of falling: a three-armed multi-centre randomized controlled trial (Hager et al., 2024), Switzerland	To compare the effectiveness of a partially supervised home-based exercise program with self-directed exercise in preventing falls in older adults, and to evaluate impacts on physical function, quality of life, and exercise adherence.	405 elderly individuals aged ≥65 years with fall risk. Participants were randomized into three groups: experimental group (empowerment-based Test & Exercise program with tablets), reference group (partially supervised Otago program), and control group (self-directed Helsana program).	Randomized controlled trial conducted over 12 months. All participants performed exercises three times weekly with varying levels of supervision.	Significant reduction in fear of falling was observed in the Otago group. Results indicate that partially supervised programs, particularly in the reference group, more effectively reduce fear of falling while enhancing	Both experimental and reference groups demonstrated significant improvements in balance (measured by Short Physical Performance Battery) and functional strength (Five Time Sit to Stand Test) compared to the control group.

					strength and functional mobility.	
3	The effect of the Otago Exercise Program on fear of falling in community dwellers aged 65-80 and associated factors (Ángeles et al., 2022), Spain	To evaluate the efficacy of the Otago Exercise Program (OEP) in reducing fear of falling among community-dwelling older adults aged 65-80 years in Spain.	498 elderly participants (67.07% female) with a mean age of 71.81 years.	Quasi-experimental design. OEP sessions were initially conducted at health centers by trained instructors for five sessions, followed by home-based continuation. Twelve-month follow-up assessment included bivariate analysis and logistic regression.	Implementation of the OEP significantly reduced overall fear of falling among participants.	Diminished balance was associated with decreased functional capacity and impaired gait, correlating with increased fall risk in participants.
4.	Effects of a modified Otago exercise program delivered through outpatient physical therapy to community-dwelling older adult fallers in Greece during the COVID-19 pandemic: a controlled, randomized, multicenter trial (Lytras et al., 2022) Greece	To investigate the effectiveness of video-supported Otago Exercise Program in improving balance, functional capacity, reducing fear of falling, and decreasing fall incidence among older adults with fall history in Greece.	150 elderly individuals aged 65-80 years (88.7% female) randomized into intervention and control group.	Randomized controlled trial. The intervention group followed OEP for 6 months, initially three times weekly, later reduced to once weekly. The control group received only an exercise information leaflet. Outcomes were assessed at baseline, 6 months, and 12 months.	x months of OEP implementation resulted in sustained reduction of fear of falling and fall incidence through the 12-month follow-up period.	Six months of OEP resulted in significant improvements in balance parameters and functional capacity.
5	The Effect of Otago Exercises on Fear of Falling,	This study examined the effects of the Otago Exercise Program	The sample comprised 56 participants who were randomly allocated into	Randomized Controlled Trial. Data collection occurred at	The intervention showed no significant difference in	Findings demonstrated that OEP significantly improved

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	Balance, Empowerment, and Functional Mobility in Older Adults: A Randomized Controlled Trial (Genç and Bilgili, 2023), Turkey	(OEP) on fear of falling, balance, empowerment, and functional mobility among older adults residing in nursing homes.	intervention and control groups, with stratification by age and gender ensuring balanced distribution between groups.	baseline, week 8, and week 12. The intervention group performed Otago exercises three times weekly for the initial 4 weeks, followed by 8 weeks of continuation with both in-person supervision and telephone follow-up.	fear of falling, potentially attributable to participants' initially low baseline fear levels and the relatively brief follow-up period.	balance parameters in the intervention group.
6.	Feasibility and Effectiveness of a Novel Integrating Physical Therapy Exercise and Dance Movement Therapy on Fall Risk in Community-Dwelling Older Women: A Randomized Pilot Study (Pitluk Barash, Shuper Engelhard and Elboim-Gabyzon, 2023) Israel	This investigation assessed the feasibility and effectiveness of a combined exercise intervention for community-dwelling older adults attending a day service center.	Eight female older adults (median age 86 years) recruited from a senior citizens' day service center participated in the study.	Quantitative Pilot Study. The intervention was conducted in a 40m ² space within a day center facility. Both study groups participated in OEP through six 40-minute group sessions, administered twice weekly over a 3-week period.	Results indicated that OEP demonstrated superior efficacy in reducing fear of falling compared to conventional physiotherapy exercises alone.	Findings revealed that OEP was more effective in enhancing balance parameters among participants.
7.	Comparison of Effects of Otago Exercise Program vs. Gaze Stability	This comparative study evaluated the relative effectiveness of the Otago	The study enrolled 30 older adults aged 65-70 years of both sexes from a residential care facility.	Experimental design. Thirty participants were randomly assigned to two	Both OEP and GSE interventions demonstrated significant beneficial	The OEP intervention demonstrated superior effectiveness and yielded more substantial

	Exercise on Balance and Fear of Falling in Older Adults (Nimmi et al., 2024), India	Exercise Program (OEP) versus Gaze Stability Exercise (GSE) on balance function and fall risk among older adults residing in institutional care.		intervention groups: the OEP group performed the standardized Otago protocol, while the GSE group performed gaze stability exercises. Both interventions were administered three times weekly for 8 weeks. Additionally, both groups received supplementary core muscle strengthening exercises.	effects on reducing fear of falling among healthy older adults.	improvements in balance parameters and fall prevention outcomes.
8	A randomized controlled trial on impact of group exercise program on fall risk, balance, strength, fear of falling and quality of life of older adults (Kulkarni et al., 2022), India	To determine the impact of a group exercise program on fall risk and modifiable risk factors in the elderly.	86 elderly over 60 years old	RCT, Subjects followed an OEP-based group or individual exercise program for 10 weeks, 2 times a week. Measurements of balance, strength, stability, fear of falling, and quality of life were taken before, after, and 6 months after the intervention.	The study showed that fear of falling was reduced in both groups after 10 weeks and lasted up to 6 months. However, in the experimental group, the effect tended to decrease over time. Comparison between groups showed no significant differences.	Group exercise programs are effective in improving balance.
9	Impact of exercise guidance timing on physical and cognitive	This study aimed to assess the effect of timing of guidance on balance, gait,	24 elderly (mean age 74 ± 6 years)	Pilot Study, Two cohorts of age-matched older adults participated in a 12-week OEP	Fear of falling demonstrated statistically significant reduction in	OEP represents a validated and reliable balance training protocol suitable for diverse

	function in older adults: A pilot study (Lampropoulou, Kellari and Sakellari, 2023), Cyprus	fall risk, and cognitive function.		targeting strength and balance enhancement. Group 1 received visual and verbal guidance prior to exercise initiation, while Group 2 received concurrent guidance during exercise execution. Outcomes were evaluated at baseline, week 6, and week 12 of the intervention.	both groups following the intervention, with no significant between-group differences observed.	populations. Its efficacy in improving balance was substantiated by the outcomes of this 12-week intervention.
10	Effects of Otago and Fit-and-Fall Proof Home-Based Exercises on Older Adults' Balance, Quality of Life, and Fear of Falling: A Randomized, Single-Blind Clinical Trial (Sharahi and Raeisi, 2025), Iran	This study aimed to evaluate the efficacy of eight-week home-based OEP and Fit-and-Fall Proof (FFP) interventions on balance parameters, quality of life (QoL), and fear of falling (FOF) in elderly individuals.	39 older adults randomly allocated to three groups: Otago, FFP, or contro.	RCT, Intervention groups performed prescribed exercises for eight weeks, three sessions weekly, with 60-minute duration per session. Control group participants maintained their normal daily activities throughout the study period.	Eight weeks of Fit-and-Fall Proof (FFP) exercise and home-based OEP demonstrated significant reduction in fear of falling (FOF) among elderly participants.	Eight weeks of Fit-and-Fall Proof (FFP) exercise and home-based OEP yielded significant improvements in static balance (SB), dynamic balance (DB), and quality of life (QoL) parameters. However, FFP exercise demonstrated superior efficacy in enhancing dynamic balance and quality of life outcomes.
11	Comparison of the Effect of Otago and Chair Squat Exercises on the Fear of	This study aimed to develop a more cost-effective and simplified	A total of 126 older adults (aged over 60 years) were enrolled in this investigation.	RCT, The intervention was conducted over 8 weeks comprising three 45-	Post-intervention analysis revealed that the Otago program	-

	Falling and Quality of Life of Older Adults: A Clinical Trial Study (Mohammadi et al., 2025), Iran	methodology to reduce fear of falling and enhance quality of life among elderly individuals.		minute training sessions weekly in home settings. Participants were randomized into three groups: Chair Squat, Otago, or control. Fear of falling and quality of life metrics were assessed pre- and post-intervention.	demonstrate superior efficacy compared to chair squats in reducing mean fear of falling scores.	
12	The Effect of Group-Based Otago Exercise Program on Fear of Falling and Physical Function Among Older Adults Living in Nursing Homes: A Pilot Trial (Zou et al., 2022), China	This study investigated the feasibility of implementing group-based OEP and its impact on fear of falling (FOF) and physical function parameters in older adults.	57 elderly participants were allocated to an intervention group (29 individuals from one nursing home) and a control group (28 individuals from two nursing homes).	Pilot Study, The intervention group participated in group-based OEP for 12 weeks, while the control group received standard care.	Following the 12-week intervention period, the intervention group exhibited significant improvement on the mSAFFE scale (indicating reduced fear of falling).	After 12 weeks, the intervention group demonstrated significant improvement in FSBT scores (indicating enhanced balance), whereas the control group exhibited deterioration in FSBT performance.

Table 2. Critical Appraisal of the Included Articles

No.	Article	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
1	Tep et al. (2023)	Y	Y	Y	UK	UK	Y	Y	Y	Y	Y	Y
2	Hager et al. (2024)	Y	Y	Y	UK	UK	Y	Y	Y	Y	Y	Y
3	Ángeles et al. (2022)	Y	Y	Y	UK	UK	Y	Y	Y	N	Y	Y
4	Lytras et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5	Genç and Bilgili (2023)	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
6	Pitluk-Barash et al (2023)	Y	Y	Y	Y	N	Y	Y	Y	Y	T	Y
7	Nimmi et al. (2024)	Y	Y	Y	UK	Y	Y	Y	Y	Y	Y	Y
8	Kulkarni et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9	Lampropoulou et al (2023)	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
10	Sharahi and Raeisi (2025)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11	Mohammadi et al. (2025)	Y	Y	Y	UK	UK	Y	Y	Y	Y	Y	Y
12	Zou et al. (2022)	Y	Y	Y	Y	UK	Y	Y	Y	Y	Y	Y

Description: Y=Yes; N=No; UK = UnKnown

CONCLUSION

This study provides compelling evidence for the efficacy of the Otago

Exercise Program (OEP) in enhancing balance, improving functional strength, and mitigating fear of falling among older adults. The primary research objective of evaluating the program's effectiveness has been successfully accomplished. These findings have significant implications for community health, particularly in promoting autonomy and physical activity in elderly populations, while also offering healthcare professionals evidence-based guidance for implementing effective exercise interventions. The study

contributes meaningfully to the advancement of geriatric rehabilitation science and falls prevention research, establishing a foundation for broader OEP implementation across diverse communities. To maximize long-term benefits, it is recommended that the OEP be systematically incorporated into elderly health services and further refined through personalized exercise parameters, including duration and intensity.

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